Honors Chemistry Quiz: Chapter 4

Chemical Quantities and Aqueous Reactions

Name: _____ Period: _____ Date: _____

This quiz is worth 52 points; each correct response is worth 2 points. Only those quizzes completed in black ink will be graded. Good luck!

1) Consider the following reaction. How many moles of oxygen are required to produce 2.33 moles of water? Assume that there is excess C_3H_7SH present.

$$C_3H_7SH(l) + 6\ O_2(g) \rightarrow 3\ CO_2(g) + SO_2(g) + 4\ H_2O\ (g)$$

A) 1.55 moles O_2
B) 3.50 moles O_2
B C) 2.33 moles O_2
D) 4.14 moles O_2
E) 6.21 moles O_2

2) Consider the following balanced reaction. How many grams of water are required to form 75.9 g of HNO_3? Assume that there is excess NO_2 present. The molar masses are as follows: H_2O = 18.02 g/mol, HNO_3 = 63.02 g/mol.

$$3\ NO_2(g) + H_2O(l) \rightarrow 2\ HNO_3(aq) + NO(g)$$

A) 38.0 g H_2O
B) 21.7 g H_2O
D C) 43.4 g H_2O
D) 10.9 g H_2O
E) 26.5 g H_2O

3) How many molecules of H_2S are required to form 79.0 g of sulfur according to the following reaction? Assume excess SO_2.

$$2\ H_2S(g) + SO_2(g) \rightarrow 3\ S(s) + 2H_2O(l)$$

A) 1.48×10^{24} molecules H_2S
B) 9.89×10^{23} molecules H_2S
B C) 5.06×10^{25} molecules H_2S
D) 3.17×10^{25} molecules H_2S
E) 2.44×10^{23} molecules H_2S

4) A 12.39 g sample of phosphorus reacts with 42.54 g of chlorine to form only phosphorus trichloride (PCl_3). If it is the only product, what mass of PCl_3 is formed?

A) 30.15 g
B) 54.93 g
B C) 140.01 g
D) 79.71 g
E) 91.86 g

5) Determine the percent yield of a reaction that produces 28.65 g of Fe when 50.00 g of Fe_2O_3 react with excess Al according to the following reaction.

$$Fe_2O_3(s) + 2\ Al(s) \rightarrow Al_2O_3(s) + 2\ Fe(s)$$

A) 61.03 %
B) 28.65 %
E C) 57.30 %
D) 20.02 %
E) 81.93 %

6) How many moles of LiI are contained in 258.6 mL of 0.0296 M LiI solution?

A) 1.31×10^{-3} mol
B) 8.74×10^{-3} mol
E C) 1.14×10^{-3} mol
D) 3.67×10^{-3} mol
E) 7.65×10^{-3} mol

7) What is the concentration of magnesium ions in a 0.125 M $Mg(NO_3)_2$ solution?

A) 0.125 M
B) 0.0625 M
A C) 0.375 M
D) 0.250 M
E) 0.160 M

8) Determine the concentration of a solution prepared by diluting 25.0 mL of a stock 0.188 M $Ca(NO_3)_2$ solution to 150.0 mL.

A) 1.13 M
B) 0.0887 M
C C) 0.0313 M
D) 0.0199 M
E) 0.0501 M

9) How many grams of NaCl are required to make 250.0 mL of a 3.000 M solution?

A) 58.40 g
B) 175.3 g
D C) 14.60 g
D) 43.83 g
E) 27.99 g

10) According to the following reaction, what mass of $PbCl_2$ can form from 235 mL of 0.110 M KCl solution? Assume that there is excess $Pb(NO_3)_2$.

$$2\ KCl(aq) + Pb(NO_3)_2\ (aq) \rightarrow PbCl_2(s) + 2\ KNO_3(aq)$$

A) 7.19 g
B B) 3.59 g
C) 1.80 g
D) 5.94 g
E) 1.30 g

11) What volume of 0.305 M $AgNO_3$ is required to react exactly with 155.0 mL of 0.274 M Na_2SO_4 solution? Hint: You will want to write a balanced reaction.

A) 581 mL
B) 173 mL
E C) 345 mL
D) 139 mL
E) 278 mL

12) Identify NaCl.

A) weak acid
B) weak electrolyte
D C) strong acid
D) strong electrolyte
E) nonelectrolyte

13) How many of the following compounds are **soluble** in water?

$Cu(OH)_2$ $LiNO_3$ NH_4Br K_2S

A) 0
B) 1
D C) 2
D) 3
E) 4

14) What precipitate is most likely formed from a solution containing Ba^{+2}, Na^{+1}, OH^{-1}, and CO_3^{-2}.

A) NaOH
B) $BaCO_3$
B C) Na_2CO_3
D) $Ba(OH)_2$
E) None of the above

15) Which of the following pairs of aqueous solutions will form a precipitate when mixed?

A) $LiOH + Na_2S$
B) $(NH_4)_2SO_4 + LiCl$
C C) $Sr(C_2H_3O_2)_2 + Na_2SO_4$
D) $KNO_3 + NaOH$
E) None of the above solution pairs will produce a precipitate.

16) Give the **net ionic equation** for the reaction (if any) that occurs when aqueous solutions of K_2S and $Fe(NO_3)_2$ are mixed.

A) $K^+(aq) + NO_3^-(aq) \rightarrow KNO_3(s)$
D B) $Fe^{2+}(aq) + S^{2-}(aq) + 2\ K^+(aq) + 2\ NO_3^-(aq) \rightarrow FeS(s) + 2\ K^+(aq) + 2\ NO_3^-(aq)$
C) $Fe^{2+}(aq) + S^{2-}(aq) + 2\ K^+(aq) + 2\ NO_3^-(aq) \rightarrow Fe^{2+}(aq) + S^{2-}(aq) + 2\ KNO_3(s)$
D) $Fe^{2+}(aq) + S^{2-}(aq) \rightarrow FeS(s)$
E) No reaction occurs.

17) Give the **complete ionic equation** for the reaction (if any) that occurs when aqueous solutions of $MgSO_3$ and HI are mixed.

A) $2\ H^+(aq) + SO_3^{2-}(aq) \rightarrow H_2SO_3(s)$
B) $Mg^{2+}(aq) + 2\ I^-(aq) \rightarrow MgI_2(s)$
E C) $2\ H^+(aq) + SO_3^{2-}(aq) + Mg^{2+}(aq) + 2\ I^-(aq) \rightarrow H_2SO_3(s) + MgI_2(aq)$
D) $2\ H^+(aq) + SO_3^{2-}(aq) \rightarrow H_2O(l) + SO_2(g)$
E) None of the above represent the complete ionic equation.

18) Which of the following is an acid base reaction?

A) $C(s) + O_2(g) \rightarrow CO_2(g)$
B B) $2\ HClO_4(aq) + Ca(OH)_2(aq) \rightarrow 2\ H_2O(l) + Ca(ClO_4)_2(aq)$
C) $Fe(s) + 2\ AgNO_3(aq) \rightarrow 2\ Ag(s) + Fe(NO_3)_2(aq)$
D) $MgSO_4(aq) + Ba(NO_3)_2(aq) \rightarrow Mg(NO_3)_2(aq) + BaSO_4(s)$
E) None of the above are acid base reactions.

19) Choose the reaction that represents the combustion of $C_6H_{12}O_2$.

A) $C_6H_{12}O_2(l) + 8\ O_2(g) \rightarrow 6\ CO_2(g) + 6\ H_2O(g)$

B) $Mg(s) + C_6H_{12}O_2(l) \rightarrow MgC_6H_{12}O_2(aq)$

A C) $6\ C(s) + 6\ H_2(g) + O_2(g) \rightarrow C_6H_{12}O_2(l)$

D) $C_6H_{12}O_2(l) \rightarrow 6\ C(s) + 6\ H_2(g) + O_2(g)$

E) None of the above represent the combustion of $C_6H_{12}O_2$.

20) Determine the oxidation state of P in PO_3^{3-}.

A) +3

B) +6

A C) +2

D) 0

E) -3

21) Which of the following is an oxidation-reduction reaction?

A) $HCl(aq) + LiOH(aq) \rightarrow LiCl(aq) + H_2O(l)$

B) $NaI(aq) + AgNO_3(aq) \rightarrow AgI(s) + NaNO_3(aq)$

D C) $Pb(C_2H_3O_2)_2(aq) + 2\ NaCl(aq) \rightarrow PbCl_2(s) + 2\ NaC_2H_3O_2(aq)$

D) $Mg(s) + 2\ HCl(aq) \rightarrow MgCl_2(aq) + H_2(g)$

E) All of the above are oxidation-reduction reactions.

22) What element is undergoing oxidation (if any) in the following reaction?

$$Zn(s) + 2\ AgNO_3(aq) \rightarrow Zn(NO_3)_2(aq) + 2\ Ag(s)$$

A) Zn

B) N

A C) O

D) Ag

E) This is not an oxidation-reduction reaction.

23) Determine the reducing agent in the following reaction.

$$Ni(s) + 2\ AgClO_4(aq) \rightarrow Ni(ClO_4)_2(aq) + 2\ Ag(s)$$

A) Ag

B) Ni

B C) Cl

D) O

E) This is not an oxidation-reduction reaction.

24) Identify the oxidation state of Mg in Mg(s).

$$Mg(s) + 2HCl(aq) \rightarrow MgCl_2(aq) + H_2(g)$$

A) +1
B) +2
C
C) 0
D) -1
E) -2

25) What is the oxidation number change for the bromine atom in the following unbalanced reduction half reaction:

$$BrO_3^-(aq) + H^+(aq) \rightarrow Br^-(aq) + I$$

A) -7
B) - 6
B
C) + 6
D) + 7
E) 0

26) When sodium bicarbonate reacts with hydrochloric acid, which of the following are not products of the reaction?

A) CO_2

B) H_2O

D
C) NaCl

D) Na_2CO_3

E) All of the above are products of the reaction